Mr. Michael T. Davis Pre-Calculus	Unit 2 Practice Test – Units 2.1 thru 2.7 January 17-18, 2017

Name:

Directions: In order to receive full credit, you must show all relevant work. Solve all equations for all real (rational and/or irrational) solutions and/or imaginary solutions. Give all irrational solutions in simplified radical form. Give all imaginary solutions in i-form.

1. Factor $x^2+6x-27$

$(x+9)(x-3)$

2. Solve $x^2+36=0$

$x^2=-36$

$\sqrt{x^2}=\pm\sqrt{-36}$

$x=\pm i\sqrt{36}$

$x=\pm 6i$

$\{6i, -6i\}$

3. Solve $m^2-4m-7=0$

$m=\dfrac{4\pm\sqrt{(-4)^2-4(1)(-7)}}{2}=\dfrac{4\pm\sqrt{16+28}}{2}=\dfrac{4\pm\sqrt{44}}{2}=\dfrac{4\pm 2\sqrt{11}}{2}$

$\{2+\sqrt{11}, 2-\sqrt{11}\}$

4. Solve $3y^3-24y=0$

$3y(y^2-8)=0$

$3y=0$ $\quad y^2-8=0$

$y=0$ $\quad y^2=8$

$\sqrt{y^2}=\pm\sqrt{8}$

$y=\pm 2\sqrt{2}$

$\{0, 2\sqrt{2}, -2\sqrt{2}\}$

5. Solve $3x^2-5x-28=0$

$(3x+7)(x-4)=0$

$3x+7=0$ $\quad x-4=0$

$3x=-7$ $\quad x=4$

$\{-\frac{7}{3}, 4\}$

6. Solve $x^4+2x^2-63=0$

$(x^2+9)(x^2-7)=0$

$x^2+9=0$ $\quad x^2-7=0$

$x^2=-9$ $\quad x^2=7$

$x=\pm\sqrt{-9}$ $\quad x=\pm\sqrt{7}$

$x=\pm i\sqrt{9}$

$x=\pm 3i$

$\{3i, -3i, \sqrt{7}, -\sqrt{7}\}$

7. Solve $x^3-7x^2+9x-63=0$

$x^2(x-7)+9(x-7)=0$

$(x-7)(x^2+9)=0$

$x-7=0$ $\quad x^2+9=0$

$x^2=-9$ $\quad x=\pm\sqrt{-9}$

$\{7, 3i, -3i\}$

8. Write an equation in standard form for the degree 2 polynomial function with the given solution set $\{\sqrt{7}, -\sqrt{7}\}$

$x = \sqrt{7} \quad x = -\sqrt{7}$

$x - \sqrt{7} = 0 \quad x + \sqrt{7} = 0$

$(x - \sqrt{7})(x + \sqrt{7}) = 0$

$x^2 + \sqrt{7}x - \sqrt{7}x - \sqrt{49} = 0$

$x^2 - 7 = 0$

9. A polynomial function of degree 3 has the solution set $\left\{-4, \frac{1}{3}\right\}$ with -4 as a double root. Determine an equation of the function in standard form.

$x = -4 \quad x = -4 \quad x = \frac{1}{3}$

$x + 4 = 0 \quad x + 4 = 0 \quad 3x - 1 = 0$

$(x+4)(x+4)(3x-1) = 0$

$(3x-1)(x^2 + 8x + 16) = 0$

$3x^3 + 24x^2 + 48x - x^2 - 8x - 16 = 0$

$3x^3 + 23x^2 + 40x - 16 = 0$

10. Write an equation in standard form for the degree 3 polynomial function with the given solution set $\{1, 4i, -4i\}$

$x = 1 \quad x = 4i \quad x = -4i$

$x - 1 = 0 \quad x - 4i = 0 \quad x + 4i = 0$

$i^2 = -1$

$(x-1)(x-4i)(x+4i) = 0$

$(x-1)(x^2 + 4ix - 4ix - 16i^2) = 0$

$(x-1)(x^2 + 16) = 0$

$x^3 - x^2 + 16x - 16 = 0$

11. Simplify $\frac{8y}{7} - \frac{y+28}{7} = \frac{8y - (y+28)}{7} = \frac{8y - y - 28}{7} = \frac{7y - 28}{7}$

$= y - 4$

12. Simplify: $\frac{w+4}{9} + \frac{w-1}{18} = \frac{2(w+4)}{2 \cdot 9} + \frac{w-1}{18} = \frac{2w + 8 + w - 1}{18}$

$= \frac{3w + 7}{18}$

13. Simplify: $\frac{m}{6} + \frac{n}{7} = \frac{7 \cdot m}{7 \cdot 6} + \frac{6 \cdot n}{6 \cdot 7} = \frac{7m + 6n}{42}$

14. Simplify $\frac{5}{x}-\frac{3}{x+2}$ $= \frac{5(x+2)}{x(x+2)} - \frac{3\cdot x}{(x+2)x} = \frac{5x+10-3x}{x(x+2)}$

$= \frac{2x+10}{x^2+2x}$

15. Simplify: $\frac{6\cdot x^2-1}{6\cdot x^2}+\frac{(3-2x)x}{6x\cdot x}$ $= \frac{6x^2-6}{6x^2} + \frac{3x-2x^2}{6x^2} = \frac{4x^2+3x-6}{6x^2}$

16. Simplify $\frac{9y+15}{3}$ $= 3y+5$

17. Simplify $\frac{14k+7}{21}$ $= \frac{2k+1}{3}$

18. Simplify $\frac{y-8}{8-y}$ $= -1$

19. Simplify $\frac{m^2+9}{m+3}$ already simplified

20. Simplify $\frac{3x+8}{9x^2-64}$ $= \frac{3x+8}{(3x-8)(3x+8)} = \frac{1}{3x-8}$

21. Simplify $\dfrac{3m^2+14m-5}{3m^2-10m+3}$ $= \dfrac{(3m-1)(m+5)}{(3m-1)(m-3)}$

22. Simplify $\dfrac{k^3+64}{k+4}$ $= \dfrac{(k+4)(k^2-4k+16)}{k+4} = k^2-4k+16$

23. Simplify $\dfrac{y^2+3y-18}{y^2-10y+21} \times \dfrac{y^2-4y-21}{y^2+8y+12}$ $= \dfrac{(y+6)(y-3)(y-7)(y+3)}{(y-3)(y-7)(y+2)(y+6)} = \dfrac{y+3}{y+2}$

24. Simplify $\dfrac{x^2-25}{x^2-10x} \div \dfrac{x^2+10x+25}{x^2+5x}$ $= \dfrac{(x-5)(x+5)}{x(x-10)} \cdot \dfrac{x(x+5)}{(x+5)(x+5)}$

$= \dfrac{x-5}{x-10}$

25. State all real number restrictions on x: $\dfrac{x^2-49}{x^2+100}$

x^2+100 cannot equal zero by substituting real numbers

there are no restrictions

26. State all real number restrictions on x: $\dfrac{x^2-3x-18}{5x^3-20x}$

$5x^3-20x = 5x(x^2-4) = 5x(x-2)(x+2)$

$5x \neq 0$ $\quad x \neq 0$

$x-2 \neq 0$ $\quad x \neq 2$

$x+2 \neq 0$ $\quad x \neq -2$

27. Solve $\frac{4}{6}=\frac{2w}{21}$ $\frac{2}{3}=\frac{2w}{21}$ $2(21)=3(2w)$ $42=6w$ $7=w$ $\{7\}$

28. Solve $\frac{6}{x+2}=\frac{9}{x+3}$ $(x+3)(6)=(x+2)(9)$ $6x+18=9x+18$ $6x=9x$ $0=3x$ $0=x$ $\{0\}$

29. Solve $\frac{9}{10}-y=\frac{4y}{5}$ $10\cdot\frac{9}{10}-10\cdot y=10\cdot\frac{4y}{5}$ $9-10y=2\cdot 4y$ $9=18y$ $\frac{1}{2}=y$

30. Solve $\frac{21}{h^2}-1=\frac{4}{h}$ $h^2\cdot\frac{21}{h^2}-h^2\cdot 1=h^2\cdot\frac{4}{h}$ $21-h^2=4h$ $0=h^2+4h-21$ $0=(h+7)(h-3)$ $h+7=0$ $h-3=0$ $h=-7$ $h=3$ $\{-7,3\}$

31. Solve. $1+\frac{2}{y}=\frac{4}{y-3}$ $y(y-3)1+y(y-3)\frac{2}{y}=y(y-3)\frac{4}{y-3}$ $y^2-3y+2(y-3)=4y$ $y^2-3y+2y-6=4y$ $y^2-5y-6=0$ $(y-6)(y+1)=0$ $y-6=0$ $y+1=0$ $y=6$ $y=-1$ $\{6,-1\}$

Optional Extra Credit: Solve $\frac{2}{x+1}-\frac{1}{x}=\frac{1}{6}$

$6x(x+1)\cdot\frac{2}{x+1}-6x(x+1)\frac{1}{x}=6x(x+1)\frac{1}{6}$ $6x\cdot 2-6(x+1)=x(x+1)$ $12x-6x-6=x^2+x$ $0=x^2-5x+6$ $0=(x-2)(x-3)$ $\{2,3\}$